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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 22

Application Number: 09/422,887
Filing Date: October 21, 1999
Appellant(s): FOGAL ET AL.

Charles B. Brantley II
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 21, 2003.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct. However, please note that the summary of invention contained in the brief refers to page numbers and line numbers in the original specification rather than the substitute specification filed 3/1/02.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows: the rejection of claims 13-17 under 35 USC §112, first paragraph and the rejection of claims 13-15 and 17 under 35 USC §102(b) in light of

Fogal et al (5,323,060) are no longer considered applicable because the rejections are hereby withdrawn.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 7-17 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

0,489,643 A1	de Givry	6-1992

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 7-17 are rejected under 35 U.S.C. 102(b) as being anticipated by de Givry.

Re claim 7, de Givry teaches a method of stacking a plurality of die (14, 16, 26, 28) including the steps of mounting an upper die (16) on a lower die (14) and defining a minimum angular offset with said mounting, wherein said minimum angular offset allows access to a bonding site (18) on the lower die (14). See Fig. 3 and accompanying text.

Re claim 8, de Givry teaches the step of mounting the stacked plurality of die on a substrate (12). See Fig. 2.

Re claims 9-11, de Givry teaches the steps of stacking all of the dies (14, 16, 26, 28), such that corresponding portions of any two of said dies define respective axes, and wherein said axes define an offset angle, followed by bonding wire to the dies (14, 16, 26, 28). See Fig. 3 and the third paragraph of p. 7 of the disclosure of de Givry.

Re claim 12, de Givry teaches the steps of stacking the plurality of dies (14, 16, 26, 28) along an axis, establishing an orientation for each die of said plurality of dies (14, 16, 26, 28), marginally clearing a line of sight to contact areas of any immediately underlying die with said orientation for said each die, wherein said line of sight is parallel to said axis, and clearing a line of sight to contact areas of any underlying die with said orientation for said each die (see Fig. 3 and p. 7 of translation).

Re claims 13 and 14, de Givry teaches the steps of spiraling the plurality of chips (14, 16, 26, 28) around an axis perpendicular to the plurality of chips (14, 16, 26, 28) and ensuring at most a minimum bond pad clearance to each chip of the plurality of chips (14, 16, 26, 28), wherein spiraling the plurality of chips further comprises spiraling the plurality of chips around an axis passing through each chip (Fig. 3).

Re claims 15 and 16, de Givry teaches that the step of spiraling includes spiraling the plurality of chips around an axis passing through the center of each chip and the step of ensuring bond pad clearance further comprises rotating a chip around the axis at least to the extent that a bond pad on an underlying chip is exposed (Fig. 3).

Re claim 17, de Givry teaches the steps of serially stacking all the dies (14, 16, 26, 28) and establishing a unique orientation for each die of said all dies (14, 16, 26, 28) wherein said orientation for each die defines less than a maximum underlying bond pad (18) clearance (Fig. 3 and accompanying text).

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(11) Response to Argument

A. Claims 7-8

In Fig. 3, de Givry shows four chips (14, 16, 26, 28) stacked at 45 degree angles (see de Givry translation, p. 11, claim 3). The layout of the chips prohibits a smaller angle since a smaller angle would interfere with the bond pad access to the lower chips. An angle of 45 degrees is the minimum angular offset that may be used with the chips that are shown.

Appellants remark (Brief, page 7, last paragraph) that

> "...De Givry's figure 3 as well as other figures [e.g. Figure 1] and its text emphasize providing a maximum chip-crossing angle...Such crossing, however, does define 'dead areas' between the chips, where auxiliary components may be located...It follows that minimizing de Givry's cross angle would risk providing space between the chips that is insufficient to accommodate an auxiliary component, thereby removing the true benefit that de Givry purports to offer....".

In response, this is noted and found unconvincing. Appellants appear to confuse the reader by mischaracterizing the terms "minimum" and "maximum" as used between the claimed invention and de Givry. The term "minimum" or "maximum" is merely a label or just a relative term. Claim 7 broadly recites mounting an upper die and a lower die (TWO dies), wherein a minimum angular offset, as broadly interpreted as reasonable, is merely an offset angle that allows access to a bonding site on the lower

die. When mounting two chips, there is a range of minimum angular offset that allows access to a bonding site on the lower die. In this case, it is the Examiner's position that de Givry at least teaches defining a minimum chip-crossing angle at 90 degrees so as to symmetrically maximize "dead areas" between the chips when mounting an upper die and a lower die, where auxiliary components may be located in these symmetric dead areas (see Figure 1). The de Givry reference teaches to symmetrically maximize "dead areas" between chips (Figure 1), not maximize angular offset or "maximum chip-crossing angle" as alleged by Appellants. Indeed, for example, the dies and the "dead areas" can be asymmetrically arranged by further rotating the upper die of Givry in Figure 1 to the left so as to provide an angular offset angle of about 135 degrees (see Figure 3 for a relative 135° angle between dies 14 and 26). As can be seen, such angle of 135 degrees is more than the 90 degree chip crossing angle that Appellant argues is the maximum angle.

Accordingly, the "maximum chip-crossing angle" of de Givry as alleged by Appellants is read on or the same as the "minimum angular offset" as broadly claimed by Appellants. Note that claimed subject matter, not the specification, is the measure of invention. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In Re Self, 213 USPQ 1,5 (CCPA 1982); In Re Priest, 199 USPQ 11,15 (CCPA 1978).

In addition, regarding claims 7-8, appellant argues (p. 7) that de Givry teaches using a maximum chip-crossing angle. Specifically, appellant argues that de Givry teaches that auxiliary components are located in the "dead areas" between chips and

that minimizing the cross angle would risk providing space between the chips that is insufficient to accommodate an auxiliary component, thereby removing the true benefit that de Givry purports to offer. It is noted that de Givry teaches an embodiment wherein the chips 14, 16 are crossed at right angles and wherein auxiliary components 22, 24 are located in the spaces between the chips 14, 16. However, the embodiment shown in de Givry's Fig. 3 and relied upon for the 35 U.S.C. 102(b) rejection does not specifically include any auxiliary components. In addition, the space between the chips in Fig. 3 is not large enough to fit auxiliary components. Therefore, appellant's arguments regarding the auxiliary components are not persuasive.

Appellant argues (p. 7-8) that minimizing de Givry's cross angle would interfere with the ability to provide the supports 20, 30, 32. However, Fig. 3 of the de Givry reference includes the supports 20, 30, 32. With the layout shown in Fig. 3, the chips are crossed with a minimum angular offset because a smaller angle would interfere with the bond pad access to underlying chips and would not provide enough space for the supports 20, 30, 32. Therefore, appellant's arguments regarding the support structures are not persuasive.

B. Claims 9-11

In Fig. 3, de Givry shows four chips (14, 16, 26, 28) that are stacked and then, after all four chips are stacked, performing wire bonding (see de Givry translation, p. 7, 3rd paragraph).

Appellant argues (p. 8) that the Examiner previously stated that de Givry does

not teach that the bonding step is performed after all of the dies have been stacked (paper no. 7 office action, p. 6). However, the rejection made by the Examiner in the paper no. 7 office action was based on the Fig. 1 embodiment taught by de Givry, in which de Givry does not specifically teach that the bonding step is performed after all of the dies have been stacked. It is the most recent rejection (paper no. 18, dated 7/2/02) that the appeal and this Examiner's Answer are based on. In the most recent office action, claims 9-11 were rejected under 35 U.S.C. 102(b) as being anticipated by Fig. 3 of the de Givry reference. Regarding Fig. 3, de Givry clearly states that the wire bonding (or cabling) is carried out after all four chips have been stacked (see de Givry translation, p. 7, 3rd paragraph).

Appellant refers to the de Givry translation at p. 7, paragraphs 1-2 and argues (p. 8) that "de Givry generally warns that stacking all of a module's chips before any wiring takes place is unworkable because the machines used to perform the wiring are capable of accommodating only a limited difference in elevation between the ends of a wire" and that "As a result, de Givry generally teaches stacking dies into a first discrete set, then wiring the dies in that set, then stacking a second set on the first, then wiring the dies in the second set, etc." The de Givry translation at p. 7, paragraphs 1-2 refers to the embodiment shown in Figs. 1 and 2, wherein the chips are stacked at 90 degree angles. The de Givry reference teaches that two chips 14, 16 stacked at right angles to each other must be wire bonded to the substrate before the second set of two chips 14a, 16a is stacked because the second set of chips 14a, 16a will cover the bond pads of the first set of chips 14, 16 upon stacking. In the embodiment shown in Fig. 3, the

four chips are stacked in a manner so that access to the bond pads of all four chips is provided and wire bonding can be carried out after all four chips are attached.

Appellant argues (p. 8-9) that the teachings of the de Givry reference suggest attaching a set of four chips and then cabling will be followed by an additional set of chips stacked thereon and performing additional cabling. It is not clear how the de Givry reference makes such a suggestion. As noted above, de Givry does teach attaching a set of two chips, wire bonding and then attaching a second set of two chips. Since de Givry never teaches a stack that comprises more than four chips, it can also be said that the de Givry reference suggests that no additional chips will be stacked on the set of four chips shown in Fig. 3. Even if de Givry did suggest that attaching a set of four chips and then cabling will be followed by an additional set of chips stacked thereon and performing additional cabling, appellant teaches a similar process in the specification at paragraph [0012] (see substitute specification, paper no. 16).

C. Claim 12

In the de Givry reference, Fig. 3 shows a stack of dies wherein the line of sight to contact areas of any immediately underlying die is "marginally" cleared.

Appellant argues (p. 10) that a careful analysis of de Givry indicates that it fails to disclose the limitation "marginally clearing a line of sight". However, a reference does not have to teach each limitation in the claims word-for-word in order to anticipate the claim.

Similar to the arguments regarding claims 7-8, appellant argues that de Givry

teaches the maximum cross angle and that altering the cross angle to anything less than the maximum risks leaving space between the chips that is insufficient to accommodate an auxiliary component. Even if the cross angle shown in Fig. 3 is a maximum, the cross angle is not precluded from also "marginally clearing a line of sight". If the cross angle shown in Fig. 3 was smaller, the line of sight to contact areas of any immediately underlying die would be partially blocked. Therefore, the cross angle shown in de Givry's Fig. 3 is considered to be "marginally clearing a line of sight".

D. Claims 13-16

In Fig. 3 of the de Givry reference, minimum bond pad clearance to each chip is provided. Even if the cross angle of the chips is 45 degrees, the bond pad clearance is still minimum.

Appellant argues (bottom of p. 10) that de Givry always ensures maximum bond pad clearance, which helps to ensure adequate "dead space" between the chips and adequate support structures for the chip's ends. However, even if the chips are crossed at the maximum angle, due to the dimensions and the layout of the chips, bond pad clearance is minimum.

E. Claim 17

Appellant argues (p. 11) that de Givry's disclosed cabling that occurs between stacking sets of chips interrupt the serial nature of stacking all the chips of de Givry's module. However, as pointed out in the response to the arguments regarding claims 9-

11, the four chips 14, 16, 26, 28 shown in Fig. 3 are all of the chips of the module and the de Givry reference does not suggest stacking additional chips on the stack shown in Fig. 3. Even if the de Givry reference did suggest attaching additional chips to the Fig. 3 module, appellant teaches a similar method in the specification at paragraph [0012].

Appellant argues that Fig. 3 of the de Givry reference teaches that the chips are crossed at a maximum angle, which is the opposite of defining less than maximum underlying bond pad clearance. However, even if the chips shown in Fig. 3 are crossed at a maximum angle, the underlying bond pad clearance is still less than maximum. In fact, if the underlying bond pad clearance were any smaller, portions of the bond pads would not be accessible.

F. Piecemeal Examination

Appellant presents arguments (p. 12-13) regarding the completeness of the examiner's response to the appellant's arguments during prosecution. Specifically, appellant traversed the 35 USC §112, first paragraph rejection (now withdrawn) and cited specific case law and a section of the MPEP to support the traversal. Appellant argues that the examiner maintained the rejection and failed to address the appellant's arguments regarding the case law and the section of the MPEP. However, the examiner did provide a response to appellant's arguments in the paper no. 18 office action at p. 5-6. The examiner did not specifically address the ***Spectra*** case law since the appellant's arguments in paper no. 17 were mostly directed at the ***Vickers*** case law and because a response to the appellant's arguments regarding ***Spectra*** would have

been cumulative. It is noted that appellant's paper no. 17 response included 11 pages of arguments and that, in the interest of time and brevity, the examiner's response to those arguments was only about 3 pages.

Appellant presents several arguments (p. 13-14) regarding piecemeal examination. As the examiner gains a better understanding of appellant's invention through appellant's amendments and arguments, the grounds of rejection will change and new rejections will become apparent. In addition, mention of specific figures and text of a reference are examples and are not exclusionary of the rest of the reference.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

J.L.B.

jlb
April 3, 2003

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